**Graphing Motion Lab**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Purpose:** (4 points) Write down the purpose of the lab

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**Problem:** Which car will have the greatest speed, a car rolled from a height of one book or a car rolled from a height of two books?

**Hypothesis:** (2 points) write in “If….Then…” format: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials**:

Meter stick, stopwatch, car, tape, ramp, 2 textbooks

**Procedure:**

1. Obtain your materials

2. Slant the board by resting one end on the edge of one textbook

3. Use the meter stick to mark off distances on the counter, table, or floor of 0.25 m 0.50 m, 0.75 m, and 1 m from the lower edge of the ramp.

4. Mark each spot with a piece of tape

5. Hold the car so that the back wheels are resting at the top edge of the ramp

6. Practice rolling the car down the ramp and timing the time it takes to travel to the tape.

7. Release the car and begin timing when the front wheels reach the bottom of the ramp

8. Record the time it takes the front wheels to reach each mark in DATA TABLE 1.

9. Repeat step 7 for each distance and complete three trials for each distance.  
10. Repeat steps 8 and 9 for two books high. Record the values in DATA TABLE 2.

11. Calculate the average time for each distance.

12. Using the average time for each distance and the formula for speed, calculate the speed of the car at each distance (distance in meters / avg time in seconds)

**Data Table: One Textbook**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time 1 (s) | Time 2 (s) | Time 3 (s) | Avg Time (s) | Distance (cm) | Speed (m/s) |
|  |  |  |  | 0.25 m |  |
|  |  |  |  | 0.50 m |  |
|  |  |  |  | 0.75 m |  |

**Data Table: Two Textbooks**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time 1 (s) | Time 2 (s) | Time 3 (s) | Avg Time (s) | Distance (cm) | Speed (m/s) |
|  |  |  |  | 0.25 m |  |
|  |  |  |  | 0.50 m |  |
|  |  |  |  | 0.75 m |  |

**Analysis Questions:**

1. Write out the equation for speed.

2. Make a graph of your data for both heights, using at least ½ page. Both sets of data need to be on the same graph (so you will need a key). Plot Time (seconds) on the x-axis and distance (meters) on the y-axis. Label each axis and title your graph.

3. Calculate the slope of the line for one book high and two books high. Use points on the graph from 0.25 to 1 meter to calculate slope. Show your work, the equation, and units.

* Slope (from graph) For 1 book:
* Slope (from graph) for 2 books:

4. What happens to the speed of the car as it travels over the entire distance?

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**5. Conclusion:** Accept or Reject your hypothesis – give a reason.

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